Reducing Ultra-Clean Transportation Fuel Costs with HyMelt® Hydrogen

Quarterly Report

October 1 – December 31, 2006

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Work Performed Under Cooperative Agreement No. DE-FC26-02NT41102

For

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ABSTRACT

This report describes activities for the seventeenth quarter of work performed under this agreement. MEFOS, the gasification testing subcontractor, reported to EnviRes that the pressure vessel for above atmospheric testing was delivered on November 20, 2006.

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1.0 PROJECT OBJECTIVES, SCOPE AND DESCRIPTION OF TASKS

1. Introduction

EnviRes and DOE executed the cooperative agreement for this work on September 19, 2002. This document is the seventeenth quarterly progress report under this agreement. MEFOS and Aker Kvaerner will conduct most of the significant tasks in this project through subcontracts with EnviRes.

1.1 Scope of Work

Phase I of the work to be done under this agreement consisted of conducting atmospheric gasification of coal using the HyMelt technology to produce separate hydrogen rich and carbon monoxide rich product streams. In addition smaller quantities of petroleum coke and a low value refinery stream were gasified. Phase II of the work to be done under this agreement, consists of gasification of the above-mentioned feeds at a gasifer pressure of approximately 3 bar. The results of this work will be used to evaluate the technical and economic aspects of producing ultra-clean transportation fuels using the HyMelt technology in existing and proposed refinery configurations.

1.1 Phase I Task Description

Task 1.1 Project Management and Planning

This task includes all project planning; experimental test plans; risk analysis; implementation of a bridge loan and project funding, purchasing, contracting and accounting systems with requisite auditing; and execution of contracts with MEFOS, Kvaerner and Siemens Westinghouse

Task 1.2 Preparation and Shipment of Feedstock Materials

This task consists of procuring 25 tons of coal, 15 tons of petroleum coke and 48 – 55 gal drums of aromatic extract oil; transporting the coke and coal to a pulverizing facility; pulverizing, drying and loading the coke and coal into bags; and shipping the feedstocks to MEFOS in Lulea, Sweden. EnviRes completed this task

Task 1.3 Predictive Modeling of the HyMelt Process

This task consists of generating detailed reactor energy and material balances for each feedstock using the Fact Sage pyrometallurgical thermodynamic modeling program. Kvaerner will perform detailed process simulation using the Aspen Plus process simulator. Kvaerner, MEFOS and EnviRes will evaluate and analyze the results of predictive modeling. This has been completed.

Task 1.4 Combustion Modeling and Analysis

Siemens Westinghouse will perform combustion turbine modeling using fuel gas conditions and compositions provided by task 1.3. Siemens Westinghouse completed this task.

Task 1.5 Design and Fabrication of Pilot Plant Specific Molten Iron Bath Apparatus

MEFOS will design and fabricate all solid feeding systems and oxygen injection systems required by the testing. EnviRes will assist MEFOS in designing the petroleum liquid feed system. MEFOS will design the shell of the high-pressure reactor. MEFOS and EnviRes completed the originally planned injection system for this task. MEFOS and EnviRes designed and fabricated a tuyere for submerged injection. MEFOS and EnviRes designed and fabricated a commercially feasible tuyere for testing in December 2003. We performed the testing as planned.

Task 2.0 Project Testing

Task 2.1 HyMelt Atmospheric Pressure Testing in a Molten Iron Bath

MEFOS designed and fabricated the petroleum liquid feed system. This injection system was tested in a cold flow environment. The injection systems were hot commissioned. Any equipment revisions indicated by cold flow testing and hot commissioning were made. Process performance testing was performed for each feed. MEFOS and EnviRes completed execution of this task.

Task 2.4 Above Atmospheric Pressure Testing in a Molten Metal Bath

MEFOS notified EnviRes that the delivery of the pressure vessel occurred during the week of November 20, 2006. After delivery of the pressure vessel, the refractory must be installed, and the rest of the operating system connected. The test campaign will begin during the week of April 16, 2007. The Hazop review is complete and is far enough along to allow approval to proceed.

2.0 EXECUTIVE SUMMARY OF WORK DONE DURING THIS REPORTING PERIOD

All design and safety approval efforts are nearly complete. We expect to begin pressure testing in April 2007.

3.0 Experimental

MEFOS Activities

No experimental activities were conducted by MEFOS during the reporting period.

Aker Kvaerner Activities

Aker Kvaerner performed no experimental activities during the reporting period

Siemens Westinghouse Power Corporation Activities

Siemens Westinghouse performed no experimental activities during the reporting period.

4.0 Results and Discussion

There were no experimental activities during the reporting period.

5.0 Conclusions

There are no conclusions to present

6.0 References

None

7.0 PLAN FOR THE NEXT QUARTER

Develop experimental plan for testing in April 2007.